Los Alamos National Laboratory
Site Characterization for TA-3-141

Volume 1—Summary of Site Characterization Results

February 13, 1996

Prepared for
Los Alamos National Laboratory
Industrial Hygiene Group
under Contract No. 9-XQ3-1432E-J
Work Release 95-0017

Prepared by
Radian Corporation
115 Longview Drive
White Rock, New Mexico 87544

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ACRONYMS

DAC	derived air concentration
EPA	U.S. Environmental Protection Agency
HASP	Health and Safety Plan
LANL	Los Alamos National Laboratory
LOC	level of concern
PCB	polychlorinated biphenyl
PPE	personal protective equipment
OSHA	Occupational Safety and Health Administration
Radian	Radian Corporation
TLV	threshold limit value

1. INTRODUCTION

Radian Corporation (Radian) has been tasked by Los Alamos National Laboratory (LANL) under Contract No. 9-XQ3-1432E-J, Work Release 95-0017, to conduct a survey of Building TA-3-141. The purpose of the survey is to identify existing health and safety hazards, including chemical and physical hazards at TA-3-141 so that the contractor participating in the bid process or actual renovation/reconstruction activities may be better informed of the potential hazards. Based on a historical review, the primary contaminants of concern are beryllium, copper, lead, nickel, thorium, uranium, and vanadium. Radiological contamination is also present in the building as identified by LANL. The proposed renovation project involves the dismantling of the building's interior to prepare it for the installation of a new beryllium processing shop.

1.1 REPORT DESCRIPTION

This report (Volume 1) presents a summary of the contamination and physical hazards identified during this survey. It also contains some information on beryllium and radiological contamination from surveys conducted by Laboratory personnel. Project-specific health and safety requirements are also provided. Volume 2 contains detailed survey information, data analysis, and analytical reports that were assembled to derive the summary of contamination information found in Volume 1 and survey conclusions found in Volume 2.

1.2 BUILDING BACKGROUND

Building TA-3-141 was constructed in 1959 and has been used ever since as a metal powder research facility. Most naturally occurring metals have been used in powder form in this facility. As a result of these activities, metal powder contamination of the building has occurred.

1.3 SURVEY PROTOCOLS

Samples were collected and analyzed following the detailed Sample and Testing Plan (*Los Alamos National Laboratory, Site Characterization for TA-3-141, Sampling and Testing Plan,* December 15, 1995). This plan documents the project data quality objectives, sampling and screening procedures, physical assessment survey, and quality assurance/quality control requirements. Sampling was conducted by personnel trained and experienced in the sampling methods employed. Sample analysis was conducted following standard U.S. Environmental Protection Agency (EPA) and National Institute for Occupational

Safety and Health procedures. EPA SW-846 Methods 6010 and 6020, which uses inductively coupled plasma-atomic emission spectroscopy for metals, were the primary laboratory methods employed.

1.4 SAMPLING STRATEGY

To aid in the sample collection and interpretation, the building was divided into areas based on anticipated locations of contamination. The following areas were defined:

- office areas (Rooms 100, 102, 110, 112, 113, 116, 117, 133, 135, 138, 140, and 146),
- radiological/process areas (Rooms 106, portions of 126, 130, 136, 137, 142, 144, 148, 150, 201, and 248),
- beryllium process areas (Rooms 136A, 139, and 141), and
- the roof.

Within each of these areas, similar materials (items) were grouped together and sampled to demonstrate contamination is present or absent at a certain confidence limit. Surface wipe sampling for metals was conducted on walls, horizontal surfaces, rotating equipment, the supply ventilation system, and the exhaust ventilation system. In addition, suspect polychlorinated biphenyl (PCB)-containing materials, painted surfaces, asphalt roofing materials, and bulk dusts found in the exhaust ventilation system were sampled. Consult the Sampling and Testing Plan for additional details.

1.5 LEVELS OF CONCERN

Levels of concern (LOCs) based on LANL procedures and a literature review were derived by Radian. The LOCs are conservative and are intended to protect the health and safety of personnel working on the renovation project. The LOCs were established for surface contaminants and for solid materials such as paint and bulk dust. Table 1 presents the LOCs used on this project.

Samples that exceeded the LOC were classified as contaminated. In addition, gross contamination is defined as a sample with a concentration of 25 times the LOC or dust greater than 1/8 in. thick and containing a contaminant at a level greater than the LOC.

Table 1

2. FINDINGS

Metal contamination found in TA-3-141 above the LOC includes arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, molybdenum, thorium, uranium, vanadium, and yttrium.

The elements found above the LOC most often include beryllium, copper, lead, nickel, thorium, uranium, and vanadium. Therefore, it is recommended that these elements, except copper, be monitored routinely during construction activities. The copper LOC was based on copper fumes, which should not occur unless hot work is performed. In addition, the other elements should be monitored periodically to ensure no threshold limit values (TLVs), derived air concentrations (DACs), or permissible exposure limits are exceeded. The remainder of this section presents the chemical and physical hazards noted in each building area (i.e., office area, process area, beryllium area, and roof).

2.1 OFFICE AREAS

Office areas in LANL TA-3-141 were identified as Rooms 100, 102, 110, 112, 113, 116, 117, 133, 135, 138, 146, and 149 and include the corridors, restrooms, and locker rooms. Office areas were defined as areas other than process, radiological, and beryllium areas.

2.1.1 Summary of Sampling Activities

The following is a summary of the samples collected in office areas.

2.1.1.1 HVA-2 and HV-1 supply ventilation system

Ten wipe dust samples were collected on the interior or the exterior face of the grill of supply ventilation systems HVA-2 and HV-1. The LOC for lead was exceeded on eight samples with a concentration range from 81.4 to 251 $\mu g/ft^2$. The surfaces are lead contaminated.

2.1.1.2 Walls

Nine wipe dust samples were collected on wall surfaces. No LOCs were exceeded. These surfaces are not contaminated.

Ten colors of paint were identified in Building TA-3-141. Toxic metals including lead, uranium, beryllium, and chromium were identified at a level above the LOC in nine of the ten samples collected. Only lead and chromium are common constituents in paint. The other metals are likely contaminants from the powder research activities. The paint on walls in the office areas is contaminated.

2.1.1.3 Horizontal surfaces

Three wipe dust samples were collected on horizontal surfaces less than 6 ft above the floor for

metal surface contamination. No LOCs were exceeded. Surfaces less than 6 feet above the floor are not contaminated.

Eighteen wipe dust samples were collected on horizontal surfaces greater than 6 ft above the floor for metal surface contamination. The LOC was exceeded for beryllium (five of the samples ranged from 2.47 to 16.7 $\mu g/ft^2$) and lead (ten of the samples ranged from 52.8 to 296 $\mu g/ft^2$). The elevated sample results indicate non-uniform contamination; however, no gross contamination was detected.

2.1.1.4 PCB-containing materials

Other than light ballasts, no suspect PCB-containing items were identified that will impact health and safety during the renovation project (e.g., items where construction personnel may contact PCBs).

2.1.2 Hazards Identified

The following chemical, physical, and radiological hazards were identified.

2.1.2.1 Chemical hazards

The following chemical hazards were identified during the characterization survey.

- The supply ventilation system is contaminated with lead dust.
- The walls are coated with paints that are contaminated with lead, chromium, beryllium, and/or uranium.
- Horizontal surfaces are contaminated with beryllium and lead dust.

2.1.2.2 Physical hazards

The following physical hazards were present during the site characterization survey or anticipated to be present during the proposed renovation project:

- Pressurized systems, including steam, electrical, and sprinkler systems, will require lockout/tagout.
- Work in elevated areas will be required.
- Work in tight quarters will be required.
- There are areas with moderately high pedestrian traffic.
- Construction debris may fall from elevated work areas onto those below.

2.1.2.3 Radiological hazards

Other than uranium in one paint sample, no radiological hazards were identified in the office areas.

2.2 PROCESS AREAS

Process areas were defined as Room 106 and portions of Rooms 126, 130, 136, 137, 142, 144, 148, 150, 201, and 248. Office areas, beryllium areas, and the roof were excluded from the definition.

2.2.1 Summary of Sampling Activities

The following is a summary of the samples collected and the results in process areas.

2.2.1.1 HVA-1, HV-2, and HV-3 supply ventilation system

Thirty-two wipe dust samples were collected on HVA-1, HV-2, and HV-3 supply ventilation systems and analyzed for surface metal contamination. LOCs were exceeded on ten samples (two samples for nickel and lead; eight for lead only). The nickel sample concentrations that exceeded the LOC ranged from 1500 to 1600 $\mu g/ft^2$ and were both collected on ductwork from HVA-1 located in Room 137. The lead sample concentrations that exceeded the LOC ranged from 56 to 215 $\mu g/ft^2$ and were collected on the inside of each of the supply ventilation systems. None of the concentrations exceeded gross contamination levels. The elevated sample results indicate non-uniform contamination.

2.2.1.2 Walls

Eight wipe dust samples were collected on walls for surface metal contamination. One sample (sample 1029C collected on the southeast corner of Room 248) exceeded the LOC for lead, indicating there is some surface contamination on walls. No gross contamination was noted.

Ten colors of paint were identified in Building TA-3-141. Toxic metals, including lead, uranium, beryllium, and chromium, were identified at a level above the LOC in nine of the ten samples collected. Only lead and chromium are common constituents in paint. The other metals are likely contaminants from the powder research activities. Paint on the walls in the process areas is contaminated.

2.2.1.3 Horizontal surfaces

Six wipe dust samples were collected on horizontal surfaces less than 6 ft above the floor and analyzed for surface metal contamination. Three samples exceeded LOCs (one sample for beryllium; two for lead). The high beryllium sample (sample 1237H) was collected on an electrical outlet in Room 106 and had a beryllium concentration of 2.30 $\mu g/ft^2$. The high lead samples (samples 1167N and 1041G) were collected on an electrical outlet in Room 150 and a window sill in Room 148A. The elevated lead concentrations were 63 and 88 $\mu g/ft^2$, respectively. None of these samples exceeded gross contamination levels. The elevated sample results indicate non-uniform contamination.

Twenty-one wipe dust samples were collected on horizontal surfaces greater than 6 ft above the floor and analyzed for surface metal contamination. LOCs were exceeded on ten samples (one sample for beryllium and nine for lead). The high beryllium sample (sample 1033R) was collected on a fire hose cage in Room 144 and contained a beryllium concentration of 2.20 $\mu g/ft^2$. The elevated lead samples were collected from Rooms 136 and 144 from light fixture tops, tops of ductwork, busbars, and from a ledge. Lead concentrations above the LOC ranged from 72.0 to 1120 $\mu g/ft^2$. None of the samples exceeded the gross contamination levels, although one lead sample result (sample 1093R taken from the top of ductwork) was close to the gross contamination level of 1160 $\mu g/ft^2$. The elevated sample results indicate non-uniform contamination.

Twenty-one wipe dust samples were collected on horizontal surfaces on equipment and analyzed for surface metal contamination. One sample exceeded the beryllium LOC and ten other samples exceeded the LOC for lead. The beryllium sample (sample 1229T) was collected on a storage cabinet in Room 137 and had a beryllium concentration of 4.20 $\mu g/ft^2$. The lead samples were collected from the tops of storage cabinets, glove boxes, lab hoods, and furnaces in Rooms 106, 136, and 144. Lead sample concentrations that exceeded the LOC ranged from 48 to 480 $\mu g/ft^2$. The highest lead result (sample 1215W) was taken from the top of a lab hood in Room 144. The elevated sample results indicate non-uniform contamination.

2.2.1.4 Rotating equipment

Five wipe samples were collected on rotating equipment from the mezzanine level and thirteen were collected from the first floor for surface metal analysis. The samples from the mezzanine level were collected on or near the exhaust blowers for FE-9 and FE-10. All samples exceeded the lead LOC, three exceeded the uranium LOC, two exceeded the beryllium LOC, and two exceeded the nickel LOC. The lead concentrations ranged from 214 to 2500 $\mu g/ft^2$. The high uranium samples ranged from 860 to 1350 $\mu g/ft^2$. The high nickel sample concentrations were 975 and 1280 $\mu g/ft^2$. The high beryllium samples were 2.10 and 2.70 $\mu g/ft^2$. One lead result (sample 1062N taken from FE-9 fan) was grossly contaminated (2550 $\mu g/ft^2$). These results indicate non-uniform and gross contamination on the mezzanine level.

Six of the thirteen samples collected on the first floor exceeded the LOC for lead, and one sample exceeded the LOC for beryllium. The high lead concentrations ranged from 83.2 to 300 $\mu g/ft^2$, and the

high beryllium sample contained 5.47 $\mu g/ft^2$. Rotating equipment on the first floor is contaminated.

2.2.1.5 FE-6, FE-9, and FE-10 exhaust ventilation systems

Nine wipe samples were collected on the interior of FE-6, FE-9, and FE-10 exhaust ventilation systems and analyzed for metal contamination. The lead LOC was exceeded in each ventilation system, and at least one other contaminant was also exceeded in each ventilation system. This included beryllium (three samples exceeded the LOC with a range from 22 to 69 $\mu g/ft^2$), vanadium (one sample exceeded the LOC with a concentration of 2430 $\mu g/ft^2$), copper (two samples exceeded the LOC with concentrations of 2000 and 42,500 $\mu g/ft^2$), lead (nine samples exceeded the LOC with a range from 57 to 784 $\mu g/ft^2$) and uranium (five samples exceeded the LOC with a range from 687 to 2100 $\mu g/ft^2$). The sample results indicate non-uniform gross contamination.

Five dust samples were collected in the exhaust ventilation system and were submitted for full metals analysis. The LOCs for beryllium, copper, and lead were exceeded in each sample. LOCs exceeded included beryllium (five samples exceeded the LOC with a range from 3.61 to 47.3 $\mu g/g$), vanadium (four samples exceeded the LOC with a range from 62 to 355 $\mu g/g$), chromium (one sample from FE-9 with a result of 1130 $\mu g/g$), nickel (two samples exceeded the LOC with results of 38,300 and 1060 $\mu g/g$), copper (five samples exceeded the LOC with a range from 263 to 32,600 $\mu g/g$), arsenic (one sample from FE-9 exceeded the LOC and contained 797 $\mu g/g$), cobalt (two samples exceeded the LOC with results of 31.4 and 95.7 $\mu g/g$), barium (two samples exceeded the LOC with results of 5560 and 1020 $\mu g/g$), lead (four samples exceeded the LOC with a range from 60.2 to 756 $\mu g/g$), thorium (five samples exceeded the LOC with a range from 89 to 365 $\mu g/g$), and uranium (one sample from FE-9 exceeding the LOC with a result of 8870 $\mu g/g$). The interior of the exhaust ventilation is grossly contaminated.

One sample from each ventilation system was analyzed for total organic carbon and flashpoint. Each sample was found to contain a concentration of at least 40% by weight and had a flashpoint higher than 140°F. The high carbon content is attributed to the quantity of graphite visually noted in the system.

Gross quantities of dust were observed or believed to be present in FE-6, FE-9, and in blanked off low areas of FE-10.

2.2.1.6 PCB-containing materials

Seven suspect PCB-containing items that could impact health and safety during renovation project (i.e., items where construction personnel may contact PCBs) were identified. PCBs were not detected in the suspect oils. Light ballasts are present and are presumed to contain PCBs.

2.2.2 Hazards Identified

The following chemical, physical, and radiological hazards were identified.

2.2.2.1 Chemical hazards

Following are the chemical hazards in the process areas.

- As a result of the contamination identified, the HVA-1, HV-2, and HV-3 supply ventilation systems were determined to be contaminated with toxic metal dust, especially lead.
- The walls are coated with paint that are contaminated with lead, chromium, beryllium, and/or uranium.
- Horizontal surfaces are contaminated with toxic metal dust.
- Rotating surfaces are contaminated with toxic metal dust, sometimes grossly contaminated.
- All exhaust ventilation systems are grossly contaminated with toxic metals.

2.2.2.2 Physical hazards

Following are the physical hazards in the process areas that were present during the site characterization survey or are anticipated to be present during the proposed renovation project:

- Lockout/tagout of pressurized systems, including compressed air, steam, electrical, and sprinkler systems, will be required.
- Electrical and slip hazards caused by leaking roof, drain line, and sewer line will require additional precautions.
- Working on elevated areas, up to 25 ft, will be necessary and will require fall protection.
- Working in tight areas will be required.
- High pedestrian traffic areas are present in the building.
- Falling construction debris from elevated work areas may be hazardous to workers below.
- Hoisting and rigging heavy objects, including electric motors and machining equipment, will be required.
- Unlevel floors and unacceptable guardrails/handrails are present on mezzanines above Rooms 106 and 130.
- Lighting is poor in the mezzanines above Rooms 106 and 130.

- There are unguarded belts on FE-11.
- There is a defective crane in Room 126.
- Asbestos panels on a laboratory hood in Room 150 may require disassembly prior to removal.
- Confined spaces under the floor in Room 136 may require entry.

2.2.2.3 Radiological hazards

Results from a survey conducted by laboratory personnel indicated radiological contamination on floors and equipment in the controlled areas and in a few locations outside of the controlled areas.

2.3 BERYLLIUM AREAS

The beryllium area (Rooms 136A, 141, and 139), constructed in 1987, is isolated from other areas of the building. Ingress and egress is conducted via Room 139. Room 136A is a highly contaminated beryllium area. Respiratory protection and protective clothing are required to enter this area. Room 141 is beryllium-contaminated, and protective clothing is required to enter. Room 139 is the dress-out area for the beryllium area. Equipment in the beryllium area is attached to new exhaust fan 1 (new FE-1) and is known to be beryllium-contaminated. Tempered air is delivered to this area via HV-2 and HVA-3. The room is visibly dusty around process equipment, indicating poor contaminant capture.

2.3.1 Summary of Sampling Activities

The following is a summary of the samples collected, along with the analytical results for each item sampled.

2.3.1.1 HV-2 and HVA-3 supply ventilation

Ten wipe dust samples were collected on supply ventilation systems and analyzed for surface metal contamination. Seven of the samples exceeded the beryllium LOC and one sample exceeded the lead LOC. The concentrations of the samples that exceeded the beryllium LOC ranged from 2.1 to 772 μg/ft. The high lead sample was collected from a cabinet in Room 136A and had a concentration of 56.6 $\mu g/ft^2$. Beryllium contamination was significantly lower in Room 141 than Room 136A. The elevated sample results indicate gross and non-uniform contamination.

2.3.1.2 Walls

Ten wipe dust samples were collected on walls and analyzed for surface metal contamination. Three samples exceeded the LOC for beryllium, which were all collected in Room 136A. None of the samples collected in Rooms 139 and 141 exceeded any of the LOCs. The concentrations of the samples that exceeded the beryllium LOC ranged from 21.9 to 753 $\mu g/ft^2$. The elevated sample results indicate

gross and non-uniform contamination.

Ten colors of paint were identified in Building TA-3-141. Toxic metals, including lead, uranium, beryllium, and chromium, were identified at a level above the LOC in nine of the ten samples collected. Only lead and chromium are common constituents in paint. The other metals are likely contaminants from the powder research activities. Painted surfaces should be treated as metal- contaminated.

2.3.1.3 Horizontal surfaces

Eight dust samples were collected on horizontal surfaces and analyzed for surface metal contamination. All samples exceeded the LOC for beryllium, and two samples from Room 136A exceeded the LOC for lead. The concentrations of the samples that exceeded the beryllium LOC ranged from 10.0 to 3790 $\mu g/ft^2$, and the samples collected that exceeded the lead LOC ranged from 52.0 to 66.0 $\mu g/ft^2$. The elevated sample results indicate gross and non-uniform contamination.

2.3.1.4 Rotating equipment

Six wipe samples were collected on rotating equipment for surface metal contamination. All samples exceeded the LOC for beryllium, and one sample from Room 136A exceeded the LOC for lead. The concentrations of the samples that exceeded the beryllium LOC ranged from 20.0 to 11,400 $\mu g/ft^2$, and the lead sample that exceeded the LOC had a concentration of 89.0 $\mu g/ft^2$. The elevated samples results indicate gross and non-uniform contamination.

2.3.1.5 FE-1 new exhaust ventilation system

Six dust samples of bulk material were collected in new FE-1 exhaust ventilation systems for surface metal contamination. All the samples exceeded LOCs for beryllium and/or lead. The concentrations of the samples that exceeded the beryllium LOC ranged from 10.7 to 48,000 $\mu g/ft^2$. The concentrations of the samples that exceeded the lead LOC ranged from 49.0 to 1140 $\mu g/ft^2$. In addition, one sample exceeded the nickel LOC with a concentration of 5080 $\mu g/ft^2$. The elevated sample results indicate gross and non-uniform contamination.

One bulk dust sample was collected in the exhaust ventilation system and was submitted for full metals analysis. Elements exceeding the LOC included beryllium (15,600 $\mu g/g^2$), vanadium (507 $\mu g/g^2$), copper (1,000 $\mu g/g^2$), arsenic (200 $\mu g/g^2$), cadmium (81.2 $\mu g/g$), cobalt (23.1 $\mu g/g^2$), lead (909 $\mu g/g^2$), and thorium (139 $\mu g/g$).

Historical dust samples collected by LANL indicate beryllium contamination above the LOC on floors, walls, and equipment. The exhaust ventilation system is grossly contaminated.

2.3.1.6 PCB-containing materials

Other than light ballasts, no suspect PCB-containing items were identified that will impact health

and safety during the renovation project (e.g., items where construction personnel may contact PCBs).

2.3.2 Hazards Identified

Following are the hazards in the beryllium area.

2.3.2.1 Chemical hazards

The following chemical hazards were identified.

- The HVA-3 and HV-2 supply ventilation systems are grossly contaminated with toxic metal dust.
- Walls are grossly contaminated with beryllium in Room 136A. There was no beryllium contamination on walls in Rooms 139 and 141. The walls are coated with paint that contains lead and chromium at a concentration greater than the LOC.
- Horizontal surfaces are grossly contaminated with beryllium dust and, in Room 136A, the lead LOC was exceeded.
- The new FE-1 exhaust ventilation system is grossly contaminated with beryllium dust and possibly lead.

2.3.2.2 Physical Hazards

The following physical hazards were present in the beryllium area during the site characterization survey or anticipated to be present during the proposed renovation project:

- Hazardous energy from pressurized systems, including helium, argon, steam, electrical, and sprinkler systems, will need to be controlled.
- Work in elevated areas will require fall protection.
- Lockout/tagout of hazardous or energized systems is required for steam, electrical, and sprinkler systems.
- There is a damaged electrical circuit at the vacuum furnace in Room 139.
- There is limited maneuverability in tight work areas.
- There is missing or unacceptable guardrail/handrail in Room 141.
- There is a deficient ladder in Room 141.
- There is poor lighting in mezzanine in Room 141.
- Falling construction debris could occur from elevated work areas.

2.3.2.3 Radiological hazards

No radiological hazards were identified in this area.

2.4 ROOF

2.4.1 Summary of Sampling Activities

The following is a summary of the samples collected from the roof, along with the analytical results for each item sampled.

2.4.1.1 Asphalt roof at supply ventilation intake

Two bulk roofing material samples were collected near the supply ventilation systems for metals and PCB analysis. No elements above the LOC, except for aluminum and magnesium, were detected. Beryllium and lead contamination was present but below the LOC.

2.4.1.2 Asphalt Roof at Exhaust Ventilation Stacks

Three bulk roofing material samples were collected near exhaust ventilation stacks for metals, PCB, and thorium analysis. No elements were above the LOC except for aluminum, calcium, magnesium, and thorium. Beryllium and lead contamination were present but below the LOC. The thorium was noted at levels slightly above the LOC ranging from 67.2 to 113 μg/g. (The thorium LOC for bulk materials is 50 μg/g.)

2.4.2 Hazards Identified

The following hazards were identified during the characterization survey.

2.4.2.1 Chemical Hazards

Aluminum, calcium, and magnesium were present at levels greater than the LOC. Because they are bound into the matrix of the material, exposure during demolition is not likely, and therefore, their presence is not a concern. TLVs for aluminum, calcium, and magnesium would only be exceeded if the TLV for nuisance dust was also exceeded. Radiological monitoring should be conducted to ensure the thorium DAC is not exceeded. Dust control will prevent the likelihood of exceeding the TLV or DAC.

2.4.2.2 Physical Hazards

The following physical hazards were present during the site characterization survey or anticipated to be present during the proposed renovation project.

- Pressurized systems, including steam, are present.
- Work in elevated areas requires fall protection.
- Lockout/tagout of hazardous or energized systems is required for steam and electrical systems.
- Fall hazard exists from the unguarded roof edge and through the skylight.
- Protection is required in and around the building from falling objects.
- Lightning, temperature extremes, and high winds are possible.

2.4.2.3 Radiological Hazards

A complete radiological characterization of the roof has not been performed. However, a limited survey did reveal potential thorium contamination.

3. SUMMARY OF CONTAMINATED ITEMS AND DRAWINGS

This section summarizes contaminated areas and ventilation system drawings that depict the extent of contamination above the LOC. It should be noted that the information depicted on these drawings was collected to support health and safety decisions and is not intended for any other purpose.

3.1 SUMMARY OF CONTAMINATED AREAS

Figure 1 presents a summary of the areas surveyed and denotes the areas found to be contaminated, and Figs. 2 through 5 are drawings depicting the extent of contamination in TA-3-141.

3.2 CONTAMINATION DRAWINGS

The drawings are provided on the following pages.

4. RENOVATION PROJECT

During the demolition and reconfiguration, the contractor must ensure that all hazards are controlled so that the work environment is safe and the health of personnel is protected. Following are some health and safety requirements that should be incorporated into the demolition bid.

4.1 HEALTH AND SAFETY REQUIREMENTS

4.1.1 Site Safety Officer

A full-time, qualified site safety officer must be provided by the contractor. The site safety officer must be on-site whenever any activity that is potentially hazardous is occurring and must have the authority to stop any activity that deemed hazardous.

4.1.2 Health and Safety Plan

A comprehensive health and safety plan (HASP) must be completed by the contractor and approved by the Laboratory prior to the start of work. The contractor may use their own HASP format or one provided by the Laboratory.

4.1.3 Task Hazard Analyses

The contractor must perform and document a task hazard analyses for each demolition task.

4.1.4 Training

All on-site workers must have Occupational Safety and Health Administration (OSHA) 40-hour HAZWOPER training and a current refresher. At least one trained HAZWOPER supervisor shall be on-site during all activities. All workers performing demolition work in radiation controlled areas must have Radiation Worker II training. All workers on-site for more than 10 consecutive days must have LANL General Employee Training (GET). At least one First Aid/CPR trained person must be on-site at all times. Sigma site-specific training is required for all workers on-site. Other specific health and safety training shall be provided by the contractor as required by OSHA regulation (e.g., hearing conservation and respiratory protection). All workers must read and participate in a discussion of the HASP prior to starting work at the site. The Laboratory will provide GET, Radiation Worker II, and Sigma Site Training. Everything else is the responsibility of the contractor.

4.1.5 Radiation Protection

All workers must be enrolled in the Laboratory's radiological surveillance program. The Laboratory will provide thermoluminescent dosimeters, bioassay, and whole body counts. The contract should note that workers will not be allowed to perform hands-on dismantlement of radiation- contaminated materials until they have completed the bioassay and whole body count.

4.1.6 Health Physics Support

The Laboratory will provide one radiation control technician and monitoring equipment for 40 hours each week, Monday through Friday, for the project. The technician will generate Radiation Work Permits and screen materials for contamination prior to free release. If additional health physics technician support is required, it is the responsibility of the contractor to provide the staffing and monitoring equipment.

4.1.7 Contractor Health and Safety Programs

The contractor is responsible for providing complete health and safety programs relevant to the work performed. This includes, but is not limited to, respiratory protection, hearing conservation, medical surveillance, and confined space entry.

4.1.8 Exposure Monitoring Report

The contractor must prepare and deliver to the Laboratory an exposure monitoring report at the end of the project. This report shall include a description of all industrial hygiene and health physics monitoring and a summary of the results.

4.2 WORK PRACTICE RECOMMENDATIONS

Because of the contamination in Building TA-3-141, some demolition work practices could create unacceptable hazards to workers. This section offers some suggestions to the contractor on work practices that can minimize those hazards.

4.2.1 Hot Work

Torch cutting of contaminated metals is strongly discouraged. This will create a tremendous potential for worker overexposure to toxic metal fumes. Strong justification and extraordinary precautions (e.g., enclosures, air line respirators) will be necessary should the contractor desire to do this. Cold cutting is the preferred method for contaminated metals.

4.2.2 Dust Suppression

To minimize worker exposure to toxic metal dusts and spread of contamination, HEPA vacuuming and wet wiping methods should be the preferred methods of collecting settled dust. Dry-sweeping and compressed air blow downs are prohibited.

4.2.3 Painted Surfaces

Painted surfaces containing lead and other toxic metals must be handled so that the metals do not become airborne. Standard lead abatement industry practices, such as needle guns with dust collection systems, should be employed when paint removal is necessary. Grinding, uncontrolled grit blasting, and surface abrasion should not be conducted.

4.2.4 Personal Air Monitoring

It is recommended that personal air monitoring for toxic metals be performed liberally at the start of the project. Once it has been determined that exposures are being controlled through ventilation, work practices, and personal protective equipment (PPE), monitoring can be scaled back. It is recommended that monitoring be performed under the direction of a Certified Industrial Hygienist and that samples be analyzed by a laboratory accredited by the American Industrial Hygiene Association.

4.2.5 Personal Protective Equipment

PPE should always be considered the last line of defense. Emphasis should first be placed on engineering controls (like ventilation) and work practice controls (like cold cutting) rather than relying on PPE. Table 2 offers some suggested PPE that could be employed to protect workers during demolition. It is expected that the contractor will modify the suggestions based upon their more intimate knowledge of how they will conduct the demolition.

Table 2. LANL TA-3-141 renovation—suggested personal protective equipment

Area/Item	Initial PPE	Major renovation activities				
		Remove process equipment >6 ft	Remove process equipment <6 ft	Remove fixtures	Gross decontamination	Final decontamination
Office	C1	—	—	D	C1	D
Process	C1	C1	C1	C1	C1	D
Radiological	C1	C1	C1	C1	C1	C1/D
Beryllium	C2	C2	C2	C2	C2	C2
Old FE-1	C1	C1	C1	—	C1	C1
New FE-1	C2	C2	C2	—	C2	C1
FE-6	C1	C1	C1	—	C1	C1
FE-9	C1	C1	C1	—	C1	C1
FE-10	C1	C1	C1	—	C1	C1

PPE Set-up C1 Radiological/Metal PPE)
Full-face respirator
Protective clothing (1 layer)
Gloves (2 layers)
Safety shoes
Hard hat
Eye protection
Exposure monitoring

PPE Set-up C2 (Beryllium Area PPE)
Full-face respirator
Beryllium coveralls
Protective clothing (2 layers)
Gloves (2 layers)
Hard hat
Safety shoes
Eye protection
Exposure monitoring

PPE Set-up D
Protective clothing (1 layer) or company clothing
Safety shoes
Hard hat
Eye protection
Periodic exposure monitoring

Notes:
1. For PPE Set-up C1, downgrade to PPE Set-up D if personal monitoring indicates exposure levels are statistically below action levels.
2. Personal exposure monitoring will be statistically based and periodically verified for each activity conducted.